Geometry Unit 9 Review

1. What is your name?

2. State the Pythagorean theorem.

3. State how you can tell if three segments can form a triangle.

4. State the converse of the Pythagorean Theorem.

5. State the formula for the 3 right triangle ratios.

6. State the formula for the magnitude of a vector.

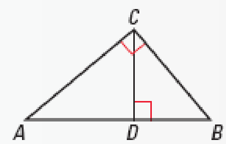
7. Compare and contrast parallel & equal vectors.

Geometry Unit 9 Review

9.1 SIMILAR RIGHT TRIANGLES

Examples on pp. 528–530

EXAMPLES



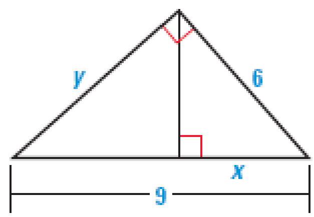
$\triangle ACB \sim \triangle CDB$, so $\frac{DB}{CB} = \frac{CB}{AB}$. CB is the geometric mean of DB and AB.

$\triangle ADC \sim \triangle ACB$, so $\frac{AD}{AC} = \frac{AC}{AB}$. AC is the geometric mean of AD and AB.

$\triangle CDB \sim \triangle ADC$, so $\frac{DA}{DC} = \frac{DC}{DB}$. DC is the geometric mean of DA and DB.

Find the value of each variable.

8.



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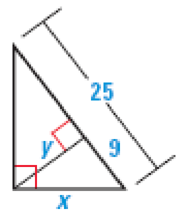
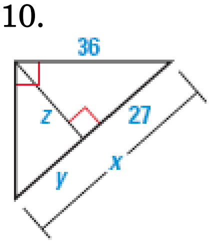


10.



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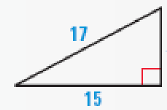
9.2 THE PYTHAGOREAN THEOREM

Examples on pp. 536–537

EXAMPLE You can use the Pythagorean Theorem to find the value of r.
$17^2 = r^2 + 15^2$, or $289 = r^2 + 225$. Then $64 = r^2$, so $r = 8$.



The side lengths 8, 15, and 17 form a Pythagorean triple because they are integers.

The variables r and s represent the lengths of the legs of a right triangle, and t represents the length of the hypotenuse. Find the unknown value. Then tell whether the lengths form a Pythagorean triple.

11. $r = 12$, $s = 16$

12. r = 8 & t = 12

13. s = 16 & t = 34

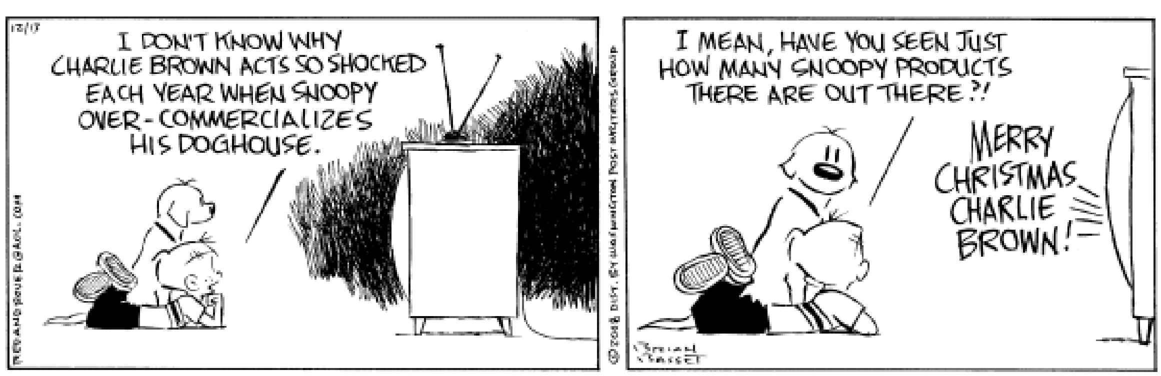
14. r = 4 & s = 6

9.3 THE CONVERSE OF THE PYTHAGOREAN THEOREM

Examples on pp. 543–545

EXAMPLES You can use side lengths to classify a triangle by its angle measures. Let a, b, and c represent the side lengths of a triangle, with c as the length of the longest side.

If $c^2 = a^2 + b^2$, the triangle is a right triangle:	$8^2 = (2\sqrt{7})^2 + 6^2$, so $2\sqrt{7}$, 6, and 8 are the side lengths of a right triangle.
If $c^2 < a^2 + b^2$, the triangle is an acute triangle:	$12^2 < 8^2 + 9^2$, so 8, 9, and 12 are the side lengths of an acute triangle.
If $c^2 > a^2 + b^2$, the triangle is an obtuse triangle:	$8^2 > 5^2 + 6^2$, so 5, 6, and 8 are the side lengths of an obtuse triangle.



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Decide whether the numbers can represent the side lengths of a triangle. If they can, classify the triangle as ***acute, right,*** or ***obtuse***.

15. 6, 7 & 10.

16. 9, 40, & 41

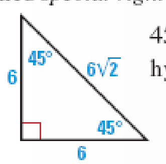
17. 8, 12, & 20

18. $3, 4\sqrt{5}, \& \ 9$

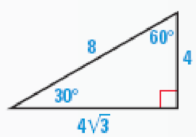
9.4 SPECIAL RIGHT TRIANGLES

Examples on pp. 551–553

EXAMPLES Triangles whose angle measures are 45°-45°-90° or 30°-60°-90° are called *special right triangles.*



45°-45°-90° triangle
hypotenuse = $\sqrt{2}$ • leg



30°-60°-90° triangle
hypotenuse = 2 • shorter leg
longer leg = $\sqrt{3}$ • shorter leg

19. An isosceles right triangle has legs of length $3\sqrt{2}$. Find the length of the hypotenuse.

20. A diagonal of a square is 6 inches long. Find its perimeter and its area.

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21. A 30°-60°-90° triangle has a hypotenuse of length 12 inches. What are the lengths of the legs?

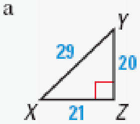
22. An equilateral triangle has sides of length 18 centimeters. Find the length of an altitude of the triangle. Then find the area of the triangle.

9.5 TRIGONOMETRIC RATIOS

Examples on pp. 558–561

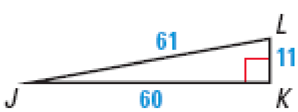
EXAMPLE A trigonometric ratio is a ratio of the lengths of two sides of a right triangle.

$\sin X = \frac{\text{opp.}}{\text{hyp.}} = \frac{20}{29}$ $\cos X = \frac{\text{adj.}}{\text{hyp.}} = \frac{21}{29}$ $\tan X = \frac{\text{opp.}}{\text{adj.}} = \frac{20}{21}$



Find the sine, the cosine, and the tangent of the acute angles of the triangle. Express each value as a decimal rounded to four places.

23.



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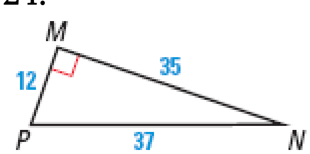

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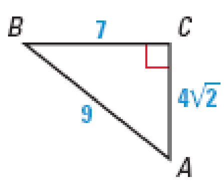

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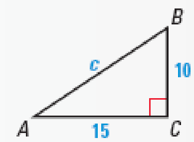
9.6 SOLVING RIGHT TRIANGLES

Examples on pp. 568–569

EXAMPLE To solve $\triangle ABC$, begin by using the Pythagorean Theorem to find the length of the hypotenuse.



$$c^2 = 10^2 + 15^2 = 325. \text{ So, } c = \sqrt{325} = 5\sqrt{13}.$$

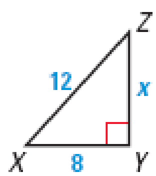
Then find $m\angle A$ and $m\angle B$.

$$\tan A = \frac{10}{15} = \frac{2}{3}. \text{ Use a calculator to find that } m\angle A \approx 33.7°.$$

Then $m\angle B = 90° - m\angle A \approx 90° - 33.7° = 56.3°$.

Solve the right triangle. Round side lengths to the nearest tenth. Round angle measures to the nearest whole number.

26.



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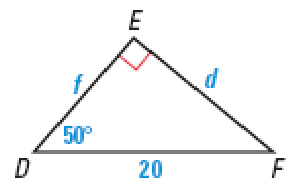

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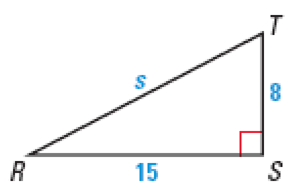

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9.7 VECTORS

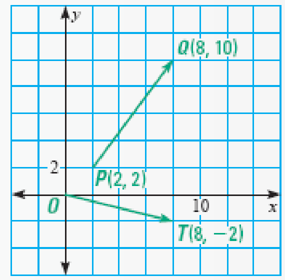
Examples on pp. 573–575

EXAMPLES You can use the Distance Formula to find the magnitude of $\overrightarrow{PQ}$.

$$|\overrightarrow{PQ}| = \sqrt{(8-2)^2 + (10-2)^2} = \sqrt{6^2 + 8^2} = \sqrt{100} = 10$$

To add vectors, find the sum of their horizontal components and the sum of their vertical components.

$$\overrightarrow{PQ} + \overrightarrow{OT} = \langle 6, 8\rangle + \langle 8, -2\rangle = \langle 6+8, 8+(-2)\rangle = \langle 14, 6\rangle$$



Write the component form of the vector and find its magnitude. Round decimals to the nearest tenth.

29. P(2, 3) & Q(1, -1)

30. P(-6, 3) & Q(6, -2)

31. P(-2, 0) & Q(1, 2)

32. Let $\overline{u} = \langle 1, 2\rangle$ & $\overline{v} = \langle 13, 7\rangle$. Find $\overline{u} + \overline{v}$. Find the magnitude of the sum vector and its direction relative to east.